STORM WATER PROGRAM ANNUAL REPORT 7/1/14 - 6/30/15

MEMPHIS STORM WATER

NPDES Permit No. TNS068276

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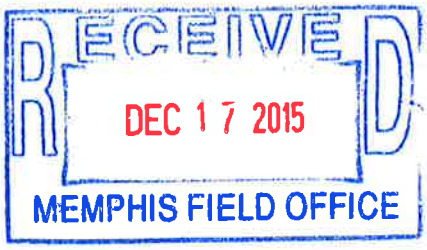

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SWMP EVALUATION

OBJECTIVE OF THE PROGRAM:

The objective of the City of Memphis storm water management program (SWMP) is to comply with the National Pollutant Discharge Elimination System (NPDES) permit elements and thereby provide control of pollutants from entering the municipal separate storm sewer system (MS4), so that the pollutants do not continue into the streams and rivers that flow through and border the City of Memphis.

MAJOR FINDINGS:

The City continued to implement the Permit requirements during the period from July 1, 2014 to June 30, 2015 ("Reporting Period"). During last reporting period, a visual stream assessment (VSA) of north Cypress Creek and its tributaries was completed. This VSA report covers approximately 15.3 miles and will facilitate the identification of illicit discharges. In addition to the VSA work, the City conducted an aerial survey of waterways, which were typically co-located with sewer lines, using infrared thermographic technology. Approximately 245 miles of waterways were surveyed. The survey included the Mississippi, Loosahatchie and Wolf Rivers, Nonconnah Creek, and associated tributaries. The areas were thermographed using thermal infrared (IR) imagery to identify leaking sewer systems, failing septic tanks, discharges from industrial facilities or other illicit discharges. Follow-up field inspections of each anomaly are on-going. Four anomalies were eliminated this Reporting Period.

The Storm Water Program (SWP) diligently works to identify responsible parties of illicit discharges due to leaking sewer systems, failing septic tanks, discharges from industrial facilities and other non-construction site discharges. SWP personnel routinely work with a TDEC criminal investigator to conduct enforcement actions against these parties as necessary. During the Reporting Period, there were 18 notices of violation and 7 civil penalties issued during the Reporting Period. A summary table of the notices of violation and civil penalties are provided in the Appendix.

MAJOR ACCOMPLISHMENTS:

The Storm Water Enterprise Fund allows the collection of a storm water fee and continues to provide a source of funding for storm water management and for high priority projects related to flood control. The City has a storm water fee credit program that allows businesses to apply for a credit to their fee. In order to be approved, the facility must implement specific storm water friendly initiatives to improve storm water management at their site. Since conception of the storm water fee, fifteen credit applications have been submitted and all have been approved. Last reporting period, sixteen credit applications were reported in error.

The City of Memphis' Division of Park Services in partnership with the Wolf River Conservancy are working together on land acquisition, planning and construction of the

Wolf River Greenway. The ultimate goal is to construct a green belt/conservation corridor along the Wolf River to link the Mississippi River linear park to the Germantown and Collierville green belts all the way to the east line of Shelby County. During last reporting period, construction of Phase 3 was completed. This 1 mile segment links Phase 2 with the Germantown Greenway, providing 5.6 miles of completed contiguous trail along the Wolf River. Germantown is in the process of constructing the eastward connecting phase of an additional 2.4 miles which will provide 8.0 miles of trails along the Wolf River once completed.

Also, the wooded floodplain areas between Humphreys's Boulevard and Wolf River Boulevard. and the Wolf River from Walnut Grove Road east to Germantown Parkway is protected by conservation easements that will prevent any future development, thus providing protected flood control/storm water control areas.

As mentioned, the City is partnered with the Wolf River Conservancy in planning and building the Wolf River Greenway. Through a private donor, who has put up fourteen million dollars, remaining survey and design work for many segments of the greenway is underway. The goal is to have all design work completed within 2 years and all construction completed within the next 3-4 years.

Current sections under design include:

Phase	Location	Design Completion Date	Construction Completion Date
Phase1	Mississippi River to 2nd Street	December 2015	November 2016
Phase 4	McLean Ave to Hollywood Street	Completed/under review by TDOT	March 2017
Phase 5A	Chelsea Ave to Nedra Street	January 2016	July 2017
Phase 5B	Nedra to James Road along McLean Avenue	February 2016	February 2017
Phase 9	Epping Way to Highland Street	January 2016	February 2017
Phase 11	Kennedy Park to Austin Peay Highway	December 2015	October 2016
Phase 14B	Walnut Grove Rd to TVA Powerline	December 2015	September 2016

During the Reporting Period, the Storm Water Program and Drain Maintenance Department continued the contract with the University of Memphis to input the drainage system into GIS. Phase VII involved the maintenance of the existing infrastructure by digitizing new or updated engineering plans gathered from the City of Memphis which was completed during the Reporting Period. Phase VIII is scheduled to begin next reporting period which will consist of the continuation of updating and maintaining the storm water database completed in the previous 6 phases. Phase VIII has a target

completion date of June 2016. A secure website is available to City staff to track project progress. Upon completion this will facilitate the tracking of illicit discharges.

The Memphis and Shelby County Household Hazardous Waste facility located at 6305 Haley Road serves Shelby County and all 7 of its cities with a year-round disposal facility free of charge. A total of 427,940 pounds of material and 5,800 vehicles were collected.

In an effort to promote education and the teaching of school age citizens on storm water concepts of water quality, storm water management, watershed management, and hydrology, the Storm Water Program designed and installed rain gardens at 3 Shelby County Schools (formerly Memphis City Schools); Belle Forrest Community School, Hickory Ridge Middle, and Kirby High School. Furthermore, grade appropriate outdoor educational curriculums around rain gardens and educational kiosks were designed for all 3 school's rain gardens. The installation of the kiosks will be completed next reporting period. The Storm Water Program has intentions of continuing storm water awareness education by installing rain gardens at qualified schools within its jurisdiction.

OVERALL PROGRAM STRENGTHS/WEAKNESSES:

The overall strength of the City's program is the City's commitment to implementing a comprehensive storm water management program through a storm water fee and budget realignment of City bureaus dedicated to storm water activities. The storm water fee credit program will serve as a mechanism to encourage storm water friendly activities as well as storm water friendly future development.

FUTURE DIRECTION OF PROGRAM:

The City will continue focusing on water quantity and water quality projects that will be funded by the Storm Water Enterprise Fund, administration of fee collection, credit, adjustment activities, and education. The City is currently operating under the 2003 – 2008 permit and will continue to do so until a new permit is issued.

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SUMMARY TABLE

Program Element	Activities required by SWMP	Complied with?	Activities completed during year	Comments
PUBLIC EDUCATION AND OUTREACH	Information for used oil turn-in locations	YES	Used Oil Brochure	Continued distribution
	12 speaking engagements and events	YES	20	See list in Appendix
	Develop Student Education Program materials within one year	YES	Materials developed in Year 1	See Appendix for additional information.
	Conduct Research into appropriate markings for storm drain stenciling	YES	Research conducted in Year 1	See Year 1 Annual Report
	2 Watershed Cleanups	YES	6 cleanups	See Narrative Element 19
	10 Press Releases	YES	11 press releases were placed	See list in Appendix
	Maintain public awareness of Storm Water Pollution Hot Line	YES	See Appendix	See Appendix
ILLICIT DISCHARGE DETECTION AND ELIMINATION	Resolve 75 % of storm water pollution complaints by correcting water quality problems.	YES	100%	See Narrative Element 11
	Map 50% of available storm system in annexed areas within 2 years of annexation.	YES	The City annexed Southwind Wyndyke Area B December 2013 and will obtain data within next year	See Narrative Element 7

Program Element	Task Activities required by SWMP	Complied With?	Activities completed during year	Comments
CONSTRUCTION RUN-OFF CONTROL	Review 90 % of erosion control plans	YES	100%	See list of reviews in Appendix
	Inspect 75 % of priority construction activities	YES	100%	See Narrative Element 16
	Inspect 90 % of sites in response to complaints	YES	100%	See list in Appendix
POST CONSTRUCTION RUNOFF CONTROL	Develop technical standards for Structural and Non-structural BMPs	YES	Informed local engineers of standards.	See Narrative Element 17
	Review 100 % of Site-specific BMP plans	YES	100%	See Narrative Element 17
	Send Maintenance Letters to all inspected structural BMPs	YES	100%	See Narrative Element 1
	Inspect all known structural BMPs by end of year 5	YES	33 % of total baseline completed; on track to complete 100% within next year.	See Narrative Element 1
	Investigate the feasibility of regional BMPs	YES	100%	See Narrative Elements 4 & 17
	Establish requirements that privately owned or operated BMPs are maintained.	YES	Previously established in City Storm Water Ordinance.	See Narrative Element 1
POLLUTION PREVENTION/ GOOD HOUSEKEEPING	Develop SWPPPS for all applicable City divisions by end of Year 2	YES	100%	See Narrative Element 5
	Water quality aspects of road construction and maintenance	YES	"Reviewed in previous years"	See Narrative Element 3

Program Element	Task Activities required by SWMP	Complied With?	Activities completed during year	Comments
	Storm Water Training for applicable City Employees complete by end of Year 3	YES	Completed employee training	See Narrative Element 5
	Inspect all City facilities by end of Year 5	YES	100 % of total baseline completed; per TDEC agreement duplicate inspections not required due to pending issuance of new permit	See Narrative Element 5

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NARRATIVE REPORT

1 Structural Controls Maintenance
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3 Roadway Maintenance
4 Flood Management
5 Municipal Facilities
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15 Monitoring program for high risk facilities
16 Construction Planning Procedures
17 Structural and non-structural BMPs
18 Prioritizing of site inspections
19 Educational activities

1 - STRUCTURAL CONTROLS MAINTENANCE

(1) Objective of the SWMP Element

To ensure that installed storm water structural controls are properly maintained for pollutant removal.

(2) SWMP Element activities completed and those in progress

Sections 33-229, 33-230, and 33-231 of the City Storm Water Ordinance pertain to private storm water detention facilities. The ordinance sets forth the legal obligation of property owners to maintain these structures and provides for enforcement mechanisms for non-compliance that results in water quality problems. The owner of a private detention facility, in accordance with the Subdivision Regulations, is required to sign a certification on the development's Final Plat that he/she is aware of his/her responsibility to maintain the storm water detention facility.

The Storm Water Management Manual (SWMM) and Subdivision Regulations govern the planning, design, maintenance and legal recordation requirements of storm water detention facilities. The Storm Water Management Manual (SWMM) consists of 3 volumes (policy, storm water quantity, and storm water quality). A Post-Construction Runoff Control Inspection and Maintenance Agreement is included in the policy volume and is to be signed by the owner/developer as part of the land development contract. In addition to standard engineering techniques, the new publication includes sustainable Best Management Practices (BMP) that can be implemented by the public. Recommendations and technical information are included to provide a method of education for persons interested in implementing these BMPs.

The City of Memphis' Division of Engineering has implemented the policies and design requirements outlined in the SWMM. All new projects that are submitted to the Division of Engineering for review are evaluated with respect to the new policies. This manual release supersedes any and all previous manual releases and other documentation of the storm water policy. The SWMM is posted at http://www.cityofmemphis.org/Government/EngineeringDivision.aspx.

During the Reporting Period, 84 Post-Construction Runoff Control Plans were reviewed. These plans represented 66 different sites with 18 re-submittals. The number of private detention facilities documented in the City's database is 438. The City continued its baseline inspection of the 438 facilities identified during the Reporting Period. Of the documented private detention structures, 146 were inspected (or 33% of the total) and letters were sent to their owners reminding them of their maintenance obligations under the City Storm Water Ordinance. In addition, 30 follow-up inspections were conducted. The Storm Water Program completed 100% of the baseline inspections from April 2005 to June 2008. The City will continue to complete inspections at an average rate of 25% per year based on the known number of private detention facilities. Also, new detention facilities continue to be tracked as part of the plan review process.

The City has established a Storm Water Enterprise Fund. Owners or users of non-residential property can apply for a credit against the monthly fee for detention facilities based on water quality and quantity criteria. A copy of the Storm Water Enterprise Fund Fee Adjustment and Credit Manual is posted on the City's web site at http://www.cityofmemphis.org/Government/PublicWorks/StormWaterInformation.aspx.

Since conception of the storm water fee, 15 credit applications have been submitted and all have been approved. Last reporting period, 16 credit applications were reported in error.

The Storm Water Program and Drain Maintenance Department continued the contract with the University of Memphis to input the drainage system into Geographic Information System (GIS). During this process, detention facilities are labeled when approximately 1,121 scanned documents (i.e., grading and drainage, off street drainage, and plan and profile) were geo-located for the entire City which brings the total number of scanned documents to 64,525. A hyperlink was created between the GIS file and scanned documents. This is a valuable resource for detention facility inspections.

During the Reporting Period, the Division of Engineering continued to scan and store grading and drainage plan sheets on its server. The majority of the plans maintained by the Division have been processed. New plans are scanned as they are submitted to the Division. The Division has stored 5,885 grading and drainage plan sheets. The scanned documents can be accessed electronically by the Storm Water Program for review.

(3) General discussion of element

Design requirements for detention facilities are presented in the SWMM. The City has had an ordinance in place since 1997 that requires owners to maintain private detention facilities and provides for enforcement. The owner/developer is required to acknowledge his obligation to maintain the detention structure on the Final Plat as required by the Subdivision Regulations. The Storm Water Program began tracking the development of new detention facilities for incorporation into the inspection program in 2005. An inspection program for private detention facilities has been in place since 2005.

All but 9 of the detention facilities inspected during the Reporting Period were properly maintained. The detention facilities at 9 commercial developments were not being properly maintained and the owners were notified via letter of their maintenance obligations. Subsequently, all issues were resolved at 5 of the locations. At the end of the Reporting Period, the City was working with the remaining 4 locations to bring it into compliance. The City will continue to inspect the detention facilities and issue notice to owners of their legal responsibility to properly maintain these structures.

(4) Status of SWMP Element

As previously stated, 33% of the known detention facilities were inspected during the Reporting Period. To date, 100% of the known total inventory has been inspected. Inspection activities are planned to continue during the next reporting period and new facilities will be added as they are developed. Ongoing improvements are being made in the detention facility approval process including design, administration, and record keeping.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to ensure that the maximum amount of pollutants are removed using the technology installed. The removal effectiveness of a detention facility can be easily verified by observing the removed gross solids. Detention facilities that exist as totally enclosed underground structures are more difficult to inspect using standard means. The Program uses a pole-mounted camera to inspect the underground facilities. Maintenance is the key to the proper operation of a detention facility.

The Storm Water Program's involvement in the development plan review process allows the program to become aware of new proposed detention facilities. The storage of 5,885 grading and drainage plans on the Division of Engineering Server should facilitate retrieval of the plans as they are needed. Also, using GIS will help with tracking and locating detention facilities.

Weaknesses in this element include difficulty in educating owners of their maintenance obligations, determining the responsible parties for maintenance in the case of non-existent property owner associations, and reimbursement for maintenance performed on private property by City crews. The long-term care of a detention facility is dependent upon the strength and viability of the property owners' association.

(6) Assessment of controls

The ability to access electronic information related to storm water detention facilities is increasing year after year. The City and County are using scanning technology to facilitate the retrieval of information related to storm water drainage on private property. A database using Microsoft Access 2003 on a shared network drive is used for tracking the inspection program and documenting activities. Photographs (in jpeg) and copies of the grading and drainage and post construction run-off control plans (in pdf) of the detention facilities are stored electronically on a shared network drive. The network drive is backed up every night by the City's Information Services Division.

Responsibility for the inspection program has been assigned to a storm water project coordinator who is responsible for inspections and database maintenance. The coordinator is made aware of the majority of new detention basins located on private property due to involvement of the Storm Water Program with the land development plan review process. Information compiled by the coordinator may be e-mailed to property owners requesting additional information, reducing the need for site visits.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

2 - DEVELOPMENT PLANNING PROCEDURES

(1) Objective of the SWMP Element

To ensure that new development and redevelopment are done in such a way as to minimize negative impacts and to protect water quality.

(2) SWMP Element activities completed and those in progress

Public Chapter 1101, passed by the Tennessee Legislature in 1998, called for every county in the state to develop a comprehensive growth policy for the next twenty years. A key component of the growth plan for Shelby County was the establishment of urban growth boundaries for each municipality within the county. An urban growth boundary defines the territory contiguous to a municipality where growth is expected over the next twenty years, and where services could most effectively be provided. The City of Memphis and surrounding suburban communities (Arlington, Bartlett, Collierville, Germantown, Lakeland, and Millington) signed a Memorandum of Agreement in June 1999 specifying the new reserve area boundaries. The City of Memphis is a major participant in the Sustainable Shelby campaign which includes as a major element maintaining and improving the environmental quality of Memphis and Shelby County.

The Office of Planning and Development (OPD) is a joint County/City planning agency. OPD prepared a Unified Development Code (UDC) for future development within the City and in unincorporated areas of the County using a form-based code approach. The UDC replaced both the Subdivision Regulations and the Zoning Ordinance. The UDC was approved and became effective January 1, 2011.

(3) General discussion of element

The storm water performance of a site and the impact it has on a watershed are the result of the additive effect of many policies, regulations, and codes. These factors become more complex as the geographic area increases.

According to the U.S. EPA document, *Using Smart Growth Techniques as Stormwater Best Management Practices* <www.epa.gov/smartgrowth>, regional planning is the process of considering community development options across a particular area that can include several political jurisdictions. The Wolf River, Loosahatchie River and Nonconnah Creek watersheds encompass various political jurisdictions. Storm water management is just one consideration of regional planning. Other factors include transportation, growth management, source water protection, economic development, emergency response and evacuation, and updated flood plain mapping. As stated in the EPA document, federal and state governments and agencies can impact storm water quantity and quality by encouraging regional planning on a watershed basis.

Within local jurisdictions, local planning departments and zoning authorities can impact storm water quantity and quality by encouraging redevelopment projects (i.e. using existing impervious area), identifying and preserving critical ecological areas and open space areas (i.e. riparian buffers), and by adopting a watershed approach when it comes to zoning and subdivision codes. Redevelopment projects can be encouraged by creating development districts, providing tax incentives, and by state and federal sponsorship of developments that incorporate early-adopter storm water friendly design and technology. Often, redevelopment projects require zoning and land-use exemptions.

Municipal engineering and public works divisions can impact storm water quantity and quality by providing design standards that require an appropriate amount of detention, developing requirements

for the use of water quality control devices where appropriate, raising sufficient revenue to fund operations and capital projects, and by encouraging and, in some cases, mandating non-structural BMPs. Local storm water programs can impact storm water quality by inspecting construction sites to insure compliance with erosion protection and sediment control regulations, collecting water samples to track water quality trends, providing enforcement of the storm water ordinance, and by promoting awareness among stakeholders of storm water issues.

The SWMM that was adopted by the City provides an array of structural and non-structural BMPs and will complement the UDC. The storm water fee credit program provides an economic incentive for the owners of both current and future developments to implement BMPs that reduce storm water run-off quantity and improve storm water run-off quality. The Storm Water Enterprise Fund provides a source of funding for high priority projects related to flood control.

The City is continuing to work on acquiring land for linear parks along the Wolf River Greenway. The greenway will extend to the City limits and link with linear parks in Germantown and Collierville all the way to the County line. This effort will help improve storm water quality and environmental awareness.

The City continued facilitating redevelopment projects within the urban center and promoting projects that incorporate storm water friendly designs in special development districts. Construction is on-going on the Clearborn Homes Project during the Reporting Period. The City continues to enforce the provisions of ordinances pertaining to the Fletcher Creek Drainage Basin overlay district.

(4) Status of SWMP Element

This element relies on the zoning and subdivision codes, the SWMM, and the storm water fee (and associated credit incentives) as a broad-based method of implementation. As previously stated, major updating of the zoning and subdivision code has been completed and a Unified Development Code produced.

(5) SWMP Element strengths and weaknesses

The strength provided by this element is the framework and funding for fostering a working relationship between the City and other jurisdictions to promote better development practices. The Phase II program of municipalities surrounding Memphis should increase greater awareness of storm water issues in those local governments. Weaknesses are the political issues traditionally associated with development and the lack of understanding water pollution impacts arising from such development. The "big picture" impacts of new developments are continually being assessed. The City continues to take a proactive position regarding the development approval process within the Fletcher Creek Drainage Basin.

(6) Assessment of controls

The development and subsequent implementation of BMPs is an inter-government effort. City Public Works personnel will continue to work with other Divisions and agencies to provide input into the development and finalization of the various planning and development guidelines as they may impact water quality.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

3 - ROADWAY MAINTENANCE

(1) Objective of the SWMP Element

To ensure that roadway maintenance and construction is performed in such a way as to minimize negative impacts to water quality.

(2) SWMP Element activities completed and those in progress

The Division of Engineering strives to ensure that future projects have adequate planning and budget for erosion control and inspection. Throughout the Reporting Period, Engineering personnel submitted erosion control plans for City roadway projects to the Storm Water Program for its review. The Division will continue to have personnel TDEC Level I and II certified as funds become available.

Street sweeping is conducted by the City's Public Works Division. The City has a fleet of 17 street sweepers. During the Reporting Period, a total of 22,719 lane miles were swept. The sweepers are cleaned and washed at 2 City facilities.

As required by Part III, Section 6 of the Permit, a review of road construction and maintenance procedures was performed during year 3 and year 5 of the permit. The permit expired June 30, 2008. No reviews were completed for this Reporting Period.

Also, as part of Part III, Section 6, the Division of Engineering along with the Tennessee Department of Transportation (TDOT) conducts bridge inspections. TDOT inspects all the bridges in the City every 2 years and an inspection was conducted in 2015. The City received the 2015 inspection report from TDOT at the end of this Reporting Period. Secondary inspections for drift removal began January 2015 and are scheduled be completed next reporting period. Inspections are also conducted from citizen complaints. The City's Drain Maintenance Department performs drift and debris removal as necessary. Division workers are aware of state permitting requirements regarding aquatic resource alteration and necessary BMPs.

(3) General discussion of element

The City has implemented policies to protect waterways from pollutant discharges due to roadway maintenance. Municipal operations, including activities conducted by Engineering, Community Enhancement, and Public Works, are not exempt from state and federal requirements regarding construction and maintenance.

(4) Status of SWMP Element

During the initial NPDES permit term (1996 to 2003), the City developed policies to minimize negative impacts to water quality from roadway maintenance. Engineering staff will continue to receive training and the Division continues to ensure projects have adequate planning and budget for erosion control.

(5) SWMP Element strengths and weaknesses

The strength of this element is that the City Street Maintenance Department is proactive in researching and implementing practices that will complete its maintenance responsibilities, while protecting water quality. The Division of Engineering is aware of the state permitting requirements regarding land disturbance and aquatic resource alteration.

Engineering makes continuing education opportunities available to its employees and is incorporating required erosion control elements into its projects and budgets. Public Works and Engineering personnel continue to increase their knowledge and obligation to minimize negative effects on storm water quality and additional support will continue from the Storm Water Program.

(6) Assessment of controls

The implementation of BMPs that are incorporated into the roadway maintenance and construction are tracked and inspected by Engineering and Storm Water Program personnel. Storm Water Program personnel will continue to work with other Divisions to increase their knowledge and obligation to minimize negative effects on storm water quality.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

4 - FLOOD MANAGEMENT

(1) Objective of the SWMP Element

To ensure that the drainage system is constructed and maintained in such a manner as to minimize negative impacts to water quality.

(2) SWMP Element activities completed and those in progress

The Division of Public Works Drain Maintenance Department is responsible for drain maintenance and repair. Public Works also operates numerous flood control stations. The Division of Engineering is responsible for flood control and drainage capital improvement projects. Revenue from the Storm Water Enterprise Fund has enabled the City to construct flood control projects that had been previously designed and were awaiting construction funding.

Over the past ten years, there has been an apparent increase in the severity of local flooding and increased public demand that corrections be implemented. A reconnaissance study was initiated by the U.S. Army Corps of Engineers in 1997 to examine flooding and related issues in the Memphis Metro Area. Their draft report in 1999 showed that due to rapid growth and urban development there have been increases in flood depths, expansion of the 100-year floodplain and flood way widths, and widespread erosion. In 2003, Joint Zoning Ordinance/Resolution No. 5007 was adopted by Memphis and Shelby County establishing the Fletcher Creek Basin Overlay District. Joint Zoning Ordination/Resolution No. 5009 subsequently required new developments within that district to have no increase in peak storm water discharge for ten year and 25 year 24 hour storms, to cause no net loss of storm water storage within the 100 year flood plain, and to have the building first floor elevation at least 2-1/2 feet above the 100 year base flood level. In 2007, the City of Memphis adopted and updated an ordinance to manage the Federal Emergency Management Agency, Flood Insurance Program and Flood Maps for the City.

The Division of Engineering continues to collect information and perform computer storm water modeling studies related to localized flooding in the City. The areas within the inner city which have seen severe flooding are located within Black Bayou, Cherry Bayou, Sophie Bayou, Harrison Creek, and Lick Creek basins. While these are established urban areas, these drainage basins have seen a general increase in residential infill as well as land-use changes from single-family residential to commercial. The proposed solutions appear to be an equal split between regional detention and channel improvement (e.g. increase height of bridge crossings). The solutions incorporate state requirements related to aquatic resource alteration. Stakeholders in the regional detention process include universities, churches, City parks, medical complexes, and all entities which have sizeable parcels and which may have their own master plans. Stakeholders in the channel improvement projects include neighborhoods and individual residents.

The preferred location for regional detention is on City owned property or private property with substantial open area due to lower acquisition costs. As stated last reporting period, design was complete for a new detention facility in the Lick Creek Basin at Catholic High School. Construction will commence summer of 2016.

Since 2014, the City has initiated 14 drainage masterplan studies. The 14 drainage masterplan studies represent several phases in a multi-year project to study, map, and improve the drainage infrastructure across the City of Memphis. In addition, the City has released a Request for Statements of Qualifications (RFSOQ) to cover up to 14 additional study areas to study the hydrologic and hydraulic characteristics of selected drainage basins. As a set, these studies will provide

recommended CIP solutions to address persistent and repetitive flooding concerns across the City. The 7 studies pursued in each fiscal year roughly equate to one project in each Council District and should result in complete coverage of the City in 8-10 years. The initial set of 7 studies should be complete in the 1st quarter of 2016 and will be used to develop a recommended set of CIP projects that will take several years to implement.

The developed and implemented drainage CIP projects will include regional floodplain improvements or detention areas, public-private partnerships to site improvements within non-City property throughout neighborhoods, conveyance capacity improvements (enlarging the existing system), and potentially constructed wetlands that could serve a secondary purpose of offsetting the environmental impact of other improvements. In recent years, such projects have included a floodplain improvement in the Days Creek drainage basin, a 7.5-million gallon underground detention basin beneath the Overton Square parking garage, and smaller detention basins at several schools (Snowden School, Christian Brothers University, Memphis Catholic High School, and Second Presbyterian Church) that permit regular use of the facility while providing storm water quantity control during inclement weather situations.

During the Reporting Period, the Public Works Drain Maintenance Department inspected 42.5 miles of drainage ditches and 15,206 inlets/catch basins. Also, clearing and cleaning activities were completed at 169 ditch locations and 12,575 inlets/catch basins. Eight hundred fifty two (852) structural repairs were completed.

(3) General discussion of element

The Public Works Drain Maintenance Department provides for the maintenance of the storm drainage system, focusing on proactive maintenance of inlets and culverts in known flooding areas and clearing debris and other objects obstructing drainage channels. Public Works also operates numerous flood control stations.

The Division of Engineering is responsible for tracking flooding complaints, evaluating capital improvement project alternatives for flood control, and constructing the projects. In addition, the Division of Engineering through its Office of Land Development is responsible for reviewing and approving Grading and Drainage Plans for projects approved by the Land Use Control Board located on private property. The Storm Water Enterprise Fund allows the Division of Public Works and Engineering to implement storm water projects that focus on remediating localized flooding problems.

(4) Status of SWMP Element

Implementation of proactive maintenance activities were continued by the Maintenance Department in accordance with Part III, Section 6 of the Permit. The Division of Engineering has initiated an aggressive capital improvement program to construct flood control projects. In addition, the City has initiated the study of the hydrologic and hydraulic characteristics of basins throughout the City to help mitigate the impacts of future storm events on public and private infrastructure. Water quality features are encouraged by a preference for grass-lined ponds designed for slow release. Also, reductions in non-residential storm water fees for water quantity and water quality benefits can be applied for through the Storm Water Enterprise Fund Credit and Adjustment Manual.

(5) SWMP Element strengths and weaknesses

The element has been an effective mechanism to ensure that the drainage system is properly maintained. The Division of Engineering has an aggressive capital improvement project schedule to

address storm water related projects and to initiate the use of computer storm water modeling to evaluate the impact of proposed private development on downstream infrastructure. Projects are selected based on severity, low costs, and ease of implementation. Weaknesses include the possible delays involved with private land access. In addition, these projects, once completed, require substantial rain events to test their worth, so that lessons may not be learned until years later. Water quality features are encouraged (as required by Part III, Section 6 of the Permit) by a preference for grass-lined detention facilities designed for slow release.

(6) Assessment of controls

The implementation of BMPs that are incorporated for flood control are tracked and inspected by Engineering and Storm Water Program personnel. Flood control projects are tracked in the same manner as structural controls. The Division of Engineering will continue to track flooding complaints and evaluate capital improvement project alternatives for flood control.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

5 – MUNICIPAL FACILITIES

(1) Objective of the SWMP Element

To operate municipal facilities in such a way as to minimize negative impacts to water quality.

(2) SWMP Element activities completed and those in progress

During the Reporting Period, as required per Part III section 6 of the permit, inspections of 100 % of City facilities were completed. One hundred percent of total baseline completed; per TDEC agreement duplicate inspections are not required due to pending issuance of new permit

During the Reporting Period, 62 applicable employees were trained in storm water awareness and/or BMPs. These employees were from the Division of Public Works, General Services, Parks, Workforce Development, Executive, and Engineering. A table presenting the training events is presented in the Appendix. The combined total to date is approximately 4,228 employees trained.

Street sweeping is conducted by the City's Public Works Division. Public Works personnel continue to increase their knowledge on storm water quality. This Division has a fleet of 17 street sweepers. During the Reporting Period, a total of 22,719 lane miles were swept. The sweepers are cleaned and washed at 2 City facilities.

The City of Memphis' Division of Park Services, in partnership with the Wolf River Conservancy, are working together on land acquisition, planning, and construction of the Wolf River Greenway. The ultimate goal is to construct a green belt/conservation corridor along the Wolf River to link the Mississippi River linear park to the Germantown and Collierville green belts all the way to the east line of Shelby County. During last the reporting period, construction of Phase 3 was completed. This 1 mile segment links Phase 2 with the Germantown Greenway, providing 5.6 miles of completed contiguous trail along the Wolf River. Germantown is in the process of constructing the eastward connecting phase of an additional 2.4 miles, which will provide 8.0 miles of trails along the Wolf River once completed.

Also, the wooded floodplain areas between Humphreys's Boulevard and Wolf River Boulevard and the Wolf River from Walnut Grove Road east to Germantown Parkway is protected by conservation easements that will prevent any future development, thus providing protected flood control/storm water control areas.

As mentioned, the City is partnered with the Wolf River Conservancy in planning and building the Wolf River Greenway. Through a private donor, who has put up fourteen million dollars, remaining survey and design work for many segments of the greenway is underway. The goal is to have all design work completed within 2 years and all construction completed within the next 3-4 years.

Current sections under design include:

Phase	Location	Design Completion Date	Construction Completion Date
Phase1	**Mississippi River to 2nd Street**	**December 2015**	**November 2016**
Phase 4	**McLean Ave to Hollywood Street**	**Completed/under review by TDOT**	**March 2017**
Phase 5A	**Chelsea Ave to Nedra Street**	**January 2016**	**July 2017**
Phase 5B	**Nedra to James Road along McLean Avenue**	**February 2016**	**February 2017**
Phase 9	**Epping Way to Highland Street**	**January 2016**	**February 2017**
Phase 11	**Kennedy Park to Austin Peay Highway**	**December 2015**	**October 2016**
Phase 14B	**Walnut Grove Rd to TVA Powerline**	**December 2015**	**September 2016**

Memphis Solid Waste currently provides weekly curbside recycling pickup for all plastic, glass, steel, aluminum, paper, corrugated, card stock, and paperboard. There are also five drop-off centers throughout the City. During the Reporting Period, 12,491.47 tons of material were collected and recycled.

During the Reporting Period, the Asphalt plant received a notice of violation from TDEC for record keeping and failure to implement good housekeeping as it pertains to its TMSP. As a result, additional storm water pollution prevention training of pertinent personnel was conducted, staff has been made aware of the location of all documentation required per the Asphalt Plant TMSP, and the storm water pollution plan has been updated to resolve all deficiencies identified on-site. On March 6, 2015 a water sample was collected per the TMSP and the results confirmed the Asphalt Plant is in compliance of its TSS limit. Storm Water Program staff will continue to monitor that proper maintenance and documentation are being performed.

(3) General discussion of element

The baseline training of applicable City employees has been completed. The Storm Water Program will continue to contact the Human Resources Department to obtain a list of all full-time employees hired for the calendar year. Subsequent training is performed for applicable employees based on that list.

During the Reporting Period, one City facility was identified requiring inspection. The Asphalt Plant inspection occurred as a result of deficiencies discussed in the notice of violation issued on March 19, 2015 in regards to the facility's TMSP. Consequently, a review and update of the facility's storm water pollution prevention plan, documentation and record keeping procedures, and installation of a vehicle wash area have been completed. In addition, the location of all required TMSP documentation has been placed on-site in a location that is assessable to pertinent employees and

available upon request. The City has completed inspections of 100 % of baseline inspections within a four year cycle. Per TDEC agreement, duplicate inspections are not required due to pending issuance of new permit. The total number of City facilities is constantly changing. The City Master Account with MLGW is used as a resource to obtain a comprehensive listing of City facilities. The storm water fee credit program offers an economic incentive to various City divisions to implement BMPs.

(4) Status of SWMP Element

The baseline training of applicable City employees as required by Part III, Section 6 of the Permit is complete. Applicable employees are being trained as required.

To date, inspections of 100 % of City facilities were completed within a four year cycle. Per TDEC, agreement duplicate inspections are not required due to pending issuance of new permit.

(5) SWMP Element strengths and weaknesses

The element appears to be effective. However, due to the number and the large distribution of City facilities and employees across a large geographic area, the inspection of facilities and training of all employees is a continuing evolution.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking the municipal training and inspection program. The network drive is backed up every night by the City's Information Services Division. Responsibility for the inspection program has been assigned to a storm water project coordinator who is responsible for inspection, training, and database maintenance.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

6 – PESTICIDES, HERBICIDES, AND FERTILIZERS

(1) Objective of the SWMP Element

To ensure that pesticides, herbicides and fertilizers are properly used and disposed in such a manner as to minimize negative impacts to water quality.

(2) SWMP Element activities completed and those in progress

The Memphis and Shelby County Household Hazardous Waste Facility, located at 6305 Haley Road, opened on November 27, 2007. Shelby County and all 7 of its cities now have a year-round disposal facility free of charge.

During the Reporting Period, a total of 427,940 pounds of material and 5,800 vehicles were collected by the facility. A location map, business hours, and allowable materials collected are made available through brochures and the Internet at www.cityofmemphis.org/Government/PublicWorks/SolidWasteManagement/HouseholdHazardousWasteCollectionFacility.aspx. This facility has proven to be a great resource for Memphis and Shelby County.

(3) General discussion of element

Improperly used and disposed pesticides, herbicides and fertilizers, including over application prior to a rain event, or improper disposal of used pesticides into drainage ways may result in surface water pollution. Education of the public about proper use and disposal keeps these materials out of the drainage system. Enforcement is available to eliminate discharges from non-compliant parties.

The household hazardous waste program involves the education of the public about the correct way to dispose of these materials, enforcement against those that dispose of materials improperly, and the establishment of a permanent disposal facility.

(4) Status of SWMP Element

During the Reporting Period, the City educated residents, conducted enforcement when materials were disposed illegally, and operated a permanent disposal facility. This element is in compliance with Part III, Sections 1 and 3 of the Permit.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to ensure that pesticides, herbicides and fertilizers are properly used and disposed. Based on the amount of material collected at the facility, there is strong public interest in this matter for proper use and disposal.

(6) Assessment of controls

The progress of this element will be tracked and documented in subsequent annual reports.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

7 – ILLICIT DISCHARGE INSPECTION/INVESTIGATION/ENFORCEMENT

(1) Objective of the SWMP Element

To identify and eliminate the sources of pollutants discharged to the drainage system.

(2) SWMP Element activities completed and those in progress

There were a total of 151 sites under investigation during the Reporting Period. There were 1,549 inspections documented by Storm Water Program employees during the Reporting Period. There were 18 notices of violation and 7 civil penalties issued during the Reporting Period. A summary table of the investigations and a summary table of the notices of violation and civil penalties are provided in the Appendix.

During the Reporting Period, the Storm Water Program and Drain Maintenance Department continued the contract with the University of Memphis to input the drainage system into GIS. Phase VII involved the maintenance of the existing infrastructure by digitizing new or updated engineering plans gathered from the City of Memphis and was completed during the Reporting Period. Phase VIII is scheduled to begin next reporting period, which will consist of the continuation of updating and maintaining the storm water database completed in the previous 6 phases. Phase VIII has a target completion date of June 2016. A secure website is available to City staff to track project progress. Upon completion, this will facilitate the tracking of illicit discharges.

During the Reporting Period, the Storm Water Program conducted a large scale education effort using transit shelters and billboards to raise general storm water awareness. The "Only Rain Down the Drain" campaign consisted of 2 billboards and 5 transit shelters. The 2 billboards were located in 5 different locations over 5 months during the reporting period. The 5 transit shelters were located in 30 different locations over a 6 month period. Over the course of the campaign, 1,403,600 impressions were made. A new method of advertising was tested during the reporting period utilizing bus backs to run in conjunction with the "Only Rain Down the Drain" billboard and transit shelter campaign. Five bus backs ran during a 1 month period. The buses ran within the City limits and had a large scale illustration demonstrating what goes down the drain comes out in our rivers. Additionally, during the Reporting Period, a large scale education effort was initiated using transit shelters to encourage proper disposal of lawn waste. The "Don't Blow It" campaign started March 2014, consisted of 9 transit shelters, and ended December 2014. The 9 transit shelters were located in over 18 different locations over the 9 month period. Over the course of the campaign, 1,342,310 impressions were made.

A large scale education effort was also conducted to discourage disposal of grease in the sanitary sewer system. The "Can the Grease" campaign was comprised of three billboards and five transit shelter ads and was conducted from July 2014 through June 2015. One billboard rotated every 6 months. The second billboard rotated every 2 months. The shelter ads were located at five locations and rotated every four weeks. It is estimated that over 78,000,000 impressions were made over the course of the campaign. Transit shelter and billboard locations are provided in the Appendix.

(3) General discussion of element

The City's inspection, investigation and enforcement program quickly responds to discharges reported and observed, and also takes the proactive approach of identifying sites with potential discharges addressing such issues before a discharge occurs. Maps of the drainage system are available in City Hall, digitally on the engineering server, and digitally on the GIS project website for

reference by the inspectors during their source tracking. Also, track mounted cameras are available from the Drain Maintenance Department for source tracking. Investigations, as well as correspondence, meetings and inspections, are tracked in the City's investigation database. This is a shared database available to all Storm Water Program staff.

(4) Status of SWMP Element

During the Reporting Period, the City continued enforcement of identified discharges and appropriate actions were taken to stop the discharges in accordance with Part III, Section 3 of the Permit. The City attempted to identify the source of releases and all known illicit discharges were eliminated or were under enforcement. The City continued its contract with the University of Memphis to store digital layers of the storm drainage system. This will assist in locating and tracking illicit discharges. Shelby County and the City of Memphis are in discussion of functional consolidation of some government services.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to ensure that pollutants are identified and eliminated. Weaknesses in the element include the difficulty in tracking non-continuous sources using field screening and visual clues, as well as the difficulty in identifying the responsible party once the source is identified.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking the site information and investigation activities. The network drive is backed up every night by the City's Information Services Division. All Storm Water Program personnel participate in enforcement activities based on their program area and enter information into the investigations database as required. Responsibility for the inspections database is shared between the manager and a storm water project coordinator who are responsible for reviewing the data entry for accuracy and consistency.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

8 – FIELD SCREENING

(1) Objective of the SWMP Element

To identify pollutant discharges that may not otherwise be evident, including field analysis of water samples and visual observations.

(2) SWMP Element activities completed and those in progress

During the Reporting Period, Storm Water Program and Drain Maintenance staff conducted visual observations throughout the City as part of sampling, investigation, maintenance duties, and citizen calls. When signs of pollution were observed, Storm Water Program staff investigated to identify the source. Drain Maintenance staff inspected 42.5 miles of the drainage system and 15,206 inlet/catch basins. During these inspections, any unknown sources were referred to the Storm Water Program.

(3) General discussion of element

City staff conducts field screening as part of sampling, investigation, maintenance duties, and citizen calls. Once problem areas are identified, the staff uses maps, aerials, and field screening techniques to identify the source of pollutants. Investigations, as well as correspondence, meetings and inspections, are tracked in the City's investigation database. This is a shared database available to all Storm Water Program staff.

(4) Status of SWMP Element

The field screening program continued during the Reporting Period in accordance with Part III, Section 3 of the Permit. Further investigation into potential areas of concern will be conducted as necessary during the next reporting period.

(5) SWMP Element strengths and weaknesses

Field screening has proven to be an effective method to characterize discharges. The Storm Water Program is equipped with GIS and global positioning system (GPS) technology to better manage data and site locations. Also, Drain Maintenance and Environmental Maintenance staff deployed throughout the City report observed illicit discharges to the Storm Water Program.

Weaknesses in the element include the difficulty in tracking non-continuous discharges, accessibility, and safety issues. Also, trained and experienced personnel are required to locate and accurately characterize discharges.

(6) Assessment of controls

The tracking system involves field inspections with Handy Map, Sanitary Sewer Outfall maps, drainage maps, USGS quadrangle maps and GPS coordinates. The use of GIS with aerial photography helps with location and land use. Also, the continued contract with the University of Memphis to input the drainage system into GIS will be a valuable tool for tracking. Once a problem area has been identified, a database using Microsoft Access 2003 on a shared network drive is used for tracking the site information and investigation activities. The network drive is backed up every night by the City's Information Services Division. All Storm Water Program personnel participate in enforcement activities based on their program area and enter information into the investigations database as required. Responsibility for the inspections database is shared between the manager and a

storm water program project coordinator who are responsible for reviewing the data entry for accuracy and consistency.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

9 - INVESTIGATION OF ILLICIT DISCHARGES WHERE REASONABLE POTENTIAL EXISTS

(1) Objective of the SWMP Element

To ensure that illicit discharges are identified and eliminated.

(2) SWMP Element activities completed and those in progress

The Storm Water Program opened 74 new investigations during the Reporting Period due to actual or potential problems observed by the storm water inspectors. Once the investigation was entered in the database, appropriate enforcement followed. City inspectors continue to identify areas where pollutants are evident or where reasonable potential exists.

During the Reporting Period, the Storm Water Program and Drain Maintenance Department continued the contract with the University of Memphis to input the drainage system into GIS. Phase VII involved the maintenance of the existing infrastructure by digitizing new or updated engineering plans gathered from the City of Memphis and was completed during the Reporting Period. Phase VIII is scheduled to begin next reporting period which consist of the continuation of updating and maintaining the storm water database completed in the previous 6 phases. Phase VIII has a target completion date of June 2016. A secure website is available to City staff to track project progress. This will be a valuable resource in the investigation of illicit discharges.

During the Reporting Period, the Storm Water Program continued to work with TDEC Memphis Field Office (MFO) personnel. Storm Water staff coordinated with the MFO personnel and conducted field investigations and enforcement for illicit discharges. These investigations were conducted from citizen complaints or from routine inspections. The Storm Water Program will continue to work with the MFO to follow these investigations.

(3) General discussion of element

Investigation of illicit discharges is necessary to track releases to their source and to have them eliminated. All illicit discharges that the City has identified are under enforcement action or have been settled. In the event an inspector observes a potential for pollutant discharges, such as improperly handled materials, the responsible party is notified to have the problem corrected before a release occurs. Maps of the drainage system are available in City Hall, digitally on the engineering server, and digitally on the GIS project website for reference by the inspectors during their investigation.

(4) Status of SWMP Element

During the Reporting Period, the City continued to enforce proper actions be taken to stop identified discharges, as required by Part III, Section 3 of the Permit.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to ensure that pollutants are identified and removed from the storm water system. Weaknesses in the element include the difficulty in tracking sources using field screening or other methods. Also the reluctance of some citizens to get involved weakens the effectiveness of the program.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking the illicit discharges, site information, and site activities. The network drive is backed up every night by the

City's Information Services Division. Responsibility for the inspection program has been assigned to a storm water project coordinator who is responsible for inspection, training, and database maintenance.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

10 – SPILL RESPONSE

(1) Objective of the SWMP Element

To ensure that spills are appropriately addressed to minimize the chance of impact on the storm drainage system.

(2) SWMP Element activities completed and those in progress

The City Storm Water Program works with the Memphis/Shelby County Emergency Management Agency (EMA) to address spill response. The EMA has an excellent program to respond to spills. The EMA, working with the Memphis Fire Department, immediately enacts an appropriate spill response clean-up. For spills that impact the City storm drains, notification is provided to the City Storm Water Program. During the Reporting Period, 0 spills were reported to the Storm Water Program.

(3) General discussion of element

The City Storm Water Program works with the EMA not to duplicate efforts and to ensure that all spills are addressed. EMA keeps the City informed of spills impacting the storm drainage system and opportunities where the Storm Water Program can assist in their efforts, since the Storm Water Program has the ability to conduct proactive enforcement.

(4) Status of SWMP Element

Spill response is part of Part III, Section 3 of the Permit and this element is in compliance with the implementation schedule in that section.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to minimize the chance that spills impact the storm drainage system and appears to be working well. A weakness in the element is identification of responsible parties for spills that are not reported immediately.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking site information and investigation activities. The network drive is backed up every night by the City's Information Services Division. Spills are reported to the manager who assigns them to a storm water project coordinator.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

11 – PUBLIC REPORTING OF ILLICIT DISCHARGES

(1) Objective of the SWMP Element

To ensure that illicit discharges are reported to the Storm Water Program as soon as possible by the public.

(2) SWMP Element activities completed and those in progress

The City has established a 24-hour storm water pollution hot line where the public can report an illicit discharge. During the Reporting Period, 63 calls were received by the hot line. A summary table of the hot line calls is provided in the Appendix. Most of the calls were either to request a Scoop the Poop sign or to inquire about the Stormwater fee. Fourteen of the calls were forwarded to a project coordinator for additional assessment. The hot line number is identified in the blue pages of the phone book as well as in storm water brochures, give-a-ways, advertisements, press releases, and on the Internet.

The City also has an Online Support Center that is operated through the Mayor's Citizen Service Center. Using the Internet or calling 3-1-1, a citizen can submit information regarding illicit discharges (or any other storm water issue) and request the City to conduct an investigation. The citizen can track the progress of the investigation online or can contact the Center for an update.

During the Reporting Period, 176 investigations were conducted as a result of citizen requests reported through the Mayor's Citizen Service Center and called into the Storm Water Program office.

In May 2006, the Storm Water Fee was established and the general public and others can call the Storm Water Program office at (901) 636-4349 for billing and other storm water questions between 7:00 AM to 3:30 PM Monday through Friday. The Storm Water Program line is identified in the blue pages of the phone book, brochures, give-a-ways, advertisements, MLGW utility bill, and the Internet.

(3) General discussion of element

The City's public reporting of illicit discharges program involves an extensive outreach effort, including educating other City employees about forwarding water pollution calls to the Storm Water Program, and making a twenty-four hour storm water pollution hot line available to the public. Once a complaint is received, it is assigned to an inspector who then investigates and follows up with the necessary enforcement.

(4) Status of SWMP Element

During the Reporting Period, the City continued public education and enforcement to have water quality problems resolved. This element is in compliance with Part III, Section 3 of the Permit.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to ensure that the public can report illicit discharges with a strength being that the complainants can report problems any time of the day. Weaknesses in the element include the fact that some of the calls are hang ups. Storm Water Program personnel are available during normal business hours for the public to contact via the general office number.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking the calls made to the storm water program. The network drive is backed up every night by the City's Information Services Division. Responsibility for the hot line has been assigned to a scheduler planner who is responsible for forwarding requests to the appropriate party and for data entry.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

12 – OIL AND HOUSEHOLD HAZARDOUS WASTE

(1) Objective of the SWMP Element

To ensure that residents dispose of oil and household hazardous waste properly, so as not to cause water pollution.

(2) SWMP Element activities completed and those in progress

It is unlawful per City ordinance to improperly dispose of oil and household hazardous waste. One investigation during the Reporting Period involved improper used oil disposal. The City continued distribution of its recycling used oil brochure, giving locations throughout Memphis that accept used motor oil. A copy of the brochure is available on the Internet at www.cityofmemphis.org/Government/PublicWorks/SolidWasteManagement/HouseholdHazardousWasteCollectionFacility.aspx.

The Memphis and Shelby County Household Hazardous Waste Facility located at 6305 Haley Road opened on November 27, 2007. Shelby County and all 7 of its cities now have a year-round disposal facility free of charge.

During the Reporting Period, the household hazardous waste facility collected 16,796 pounds of used oil. A total of 427,940 pounds of material and 5,366 vehicles were collected. A location map, business hours, and materials collected are made available through brochures and the Internet at www.cityofmemphis.org/Government/PublicWorks/SolidWasteManagement/HouseholdHazardousWasteCollectionFacility.aspx. This facility continues to prove to be a valuable resource for Memphis and Shelby County.

(3) General discussion of element

The oil and household hazardous waste program involves the education of the public about the right way to dispose of these materials, enforcement against those that dispose of materials improperly, and the establishment of a permanent disposal facility.

(4) Status of SWMP Element

During the Reporting Period, the City educated residents, conducted enforcement when materials were disposed illegally, and operated a permanent disposal facility. This element is in compliance with Part III, Sections 1 and 3 of the Permit.

(5) SWMP Element strengths and weaknesses

The strength of this element is the existing widespread knowledge that these materials must be disposed of properly and publicizing the many locations offering free disposal of used oil. The quantity of materials disposed at the waste facility has increased yearly since opening. In addition, the household hazardous waste program involves the education of the public about the proper way to dispose of these materials, enforcement against those that dispose of materials improperly, and the establishment of a permanent disposal facility.

(6) Assessment of controls

The City has an excellent tracking system for documenting and researching oil and household hazardous waste complaints, questions, and improper disposal incidents. Data will continue to be collected regarding the amount of materials disposed from the permanent facility.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

13 – SANITARY SEWER SEEPAGE

(1) Objective of the SWMP Element

Discharges of sewage from private sanitary sewers can affect the surface water system. Such discharges provide the opportunity for concentrated waste to go from the sanitary system to the storm drains which then flow to surface waters.

(2) SWMP Element activities completed and those in progress

The City continues to monitor area waterways by monthly sampling to determine the extent of bacterial contamination as discussed in the Monitoring Section of the Annual Report. During the Reporting Period, 12 rounds of monthly samples were collected from established sampling points along area rivers.

Environmental Maintenance conducts several types of line inspections on the sewer system for preventative maintenance and to ensure the system is functioning properly. Inspections include televising the mainline, inspecting the interceptor, and inspecting manholes for surcharge evidence, grease build up, and damage. The preventative maintenance program consists of City and contract crews that complete site specific inspections in problem areas to help reduce or eliminate sewer overflows. Preventive maintenance crews cleaned 1,967,593 linear feet of sewer line.

Transit shelter/billboard campaigns were conducted during the Reporting Period to encourage the public not to pour grease into their home drains. This public education will hopefully decrease the amount of grease in the lines and therefore reduce sanitary sewer overflows into the storm drainage system.

(3) General discussion of element

"Sewer seepage" from private infrastructure into subsurface soil that could significantly impact water quality of creeks and rivers is not a major concern within the city limits of Memphis. This is due to both geological conditions and the fact that most residences and other establishments are connected to the publicly owned sanitary sewer system. The upper soil, in which most private plumbing systems are installed, consists of silt, silty clay and locally minor sands that generally retard downward movement of water. Sewer seepage from private infrastructure (i.e. septic tanks, privately operated lagoons, etc.) may be more of a concern, however, in more rural areas upstream of the City.

The Storm Water Program addresses sanitary sewer concerns on an area-wide basis by monthly sampling of area waterways for E. coli. Problems involving improperly functioning private infrastructure are handled by enforcement. Problems involving publicly owned infrastructure are reported to the City Environmental Maintenance Department.

Special studies are performed as necessary to identify the nature of coliform contamination as listed in Part III (C) of the Permit. The functioning of the sanitary sewer system, including an explanation that it is separate from the storm sewer system, is part of the community storm water presentation given by the Storm Water Program.

The City conducted an aerial survey of approximately 245 waterways in February 2012. Additionally, the City conducted a follow-up field inspection of each anomaly identified in the February 2012 survey during the last reporting period. The final report for this work was completed during the Reporting Period; however a copy was submitted with the annual report for the previous reporting period. As a result of the February 2012 survey and follow-up inspection of each anomaly,

the City has revised its list of illicit discharge and elimination investigations to include the identified anomalies. During the Reporting Period, there were a total of 42 anomalies under investigation. These anomalies represented 42 miscellaneous illicit discharges and 0 sewer leaks. During the Reporting Period, 4 anomaly investigations were closed as a result of elimination of the illicit discharge. Due to access limitations and intermitted flow, the remaining anomalies will remain under investigation until the issues are resolved.

(4) Status of SWMP Element

As required by Part III, Section 3 of the Permit, the City has conducted private sanitary sewer discharge prohibition enforcement. The City plans to continue sampling and studies to determine the source and extent of bacterial contamination.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to investigate and determine the source and extent of coliform contamination and to address sanitary sewer seepage problems. The storm water fee credit program offers economic incentives to non-residential establishments to conduct drain-sewer cross connection inventories on private property.

An inherent weakness is the variety of possible sources and the temporal nature of the impacts. Interpreting source characterization data is problematic.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking site information and investigation activities. The tracking system for the monitoring results is a Microsoft Excel spreadsheet. The network drive is backed up every night by the City's Information Services Division. Responsibility for the program has been assigned to a storm water project coordinator who is responsible for locating the sampling points, performing source tracking, and spreadsheet maintenance.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

14 – HIGH RISK INDUSTRIAL FACILITY INSPECTION

(1) Objective of the SWMP Element

To ensure that facilities with the potential for significant impact to storm water from their operations have taken the proper precautions to prevent discharges.

(2) SWMP Element activities completed and those in progress

The City maintains the authority to inspect industrial facilities based on problem-oriented priorities. During the Reporting Period, the City had 1 industrial or industrial-related site investigations open for inspection and enforcement and 9 inspections were performed. The investigations database was used to track industrial investigations.

The Storm Water Program continues to get electronic updates from TDEC to report the facilities that have Individual or TMSP NPDES Permits. The Storm Water Program will continue to assist TDEC with monitoring these facilities as well as identifying additional facilities that require a permit.

The Storm Water Enterprise Fund is used to promote the use of BMPs to preserve water quality. As an incentive, owners or users of non-residential property can apply for a credit against the monthly fee for use of BMPs. A copy of the Storm Water Enterprise Fund Fee Adjustment and Credit Manual is posted on the City's web site at

http://www.memphistn.gov/Government/PublicWorks/StormWaterInformation.aspx

(3) General discussion of element

The City's high risk industrial facility inspection program involves the inspection of facilities based on problem-oriented priorities. Sites are inspected based on complaints received, staff observations, and the results of sampling while tracking the source of pollutants in the storm drain system. Activities conducted as a result of the site investigations are tracked in the database. A storm water fee credit is available to industrial facilities that demonstrate the use of BMPs. A credit is also available to facilities that have an NPDES permit for storm water.

TDEC regulates industrial and other facilities which may impact storm water quality and grants them permits for storm water discharge based on Individual or TMSP NPDES Permits. Dry weather discharges from these facilities could be permitted (i.e. non-contact cooling water) or unpermitted (periodic chemical leaks or releases, rinsate from washing operations, or other illicit discharges) into the drainage system. Wet weather discharges would be storm water that has contacted outdoor surfaces with potential chemical constituents. These discharges would potentially require a state permit based on standard industrial classification.

(4) Status of SWMP Element

During the Reporting Period, the City performed site inspections based on problem-oriented priorities as required in Part III, Section 3 of the Permit, using existing authority and procedures for site inspections.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to ensure that the necessary facilities are inspected and that the problems are corrected with a strength being the City's ability to require that deficiencies be corrected. Many industrial facilities over the years have connected storm water areas to the

sanitary sewer system. Storm water fee credits are an incentive to facilities to implement BMPs and/or for facilities that have existing NPDES permits.

Weaknesses in the element include the large number of industrial facilities across a large geographic area and unreported releases.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking site information and investigation activities. The network drive is backed up every night by the City's Information Services Division. Responsibility for industrial inspection is assigned to a storm water project coordinator who is responsible for inspection and database maintenance.

(7) Discussion of element revisions

No revisions are required at this time.

15 – MONITORING PROGRAM FOR HIGH RISK FACILITIES

(1) Objective of the SWMP Element

To determine and address the sources at facilities that may be discharging pollutants to the storm drain system.

(2) SWMP Element activities completed and those in progress

During the initial permit term (1996 to 2003), the City and TDEC worked together to develop a comprehensive monitoring approach to better assess area waterways for a variety of pollutants. The sampling plan was incorporated into the monitoring program in the Permit and includes sampling for the parameters for which the area waterways are listed on the TDEC list of impaired waterways. The City has performed all sampling in accordance with the Permit requirements. If necessary, monitoring can be performed at locations where observations or complaints indicate that discharges could be occurring. In January 2008, an additional sampling location was added by the City at the North Second Street bridge over Wolf River.

(3) General discussion of element

The City's monitoring program for high risk facilities is structured to be able to identify a location that is discharging pollutants that adversely affect area waterways. Using both laboratory analysis and watershed observations, locations are identified where additional follow-up is needed. Monthly ambient sampling provides a baseline of data and enables the storm water staff to determine when a problem occurs.

(4) Status of SWMP Element

During the Reporting Period, the City performed all monitoring in accordance with Part V, Section B of the Permit.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to monitor the large area encompassed by the City. Thus, discharged pollutants can be identified before they significantly impact water quality. Potential weakness in the element may be that an industry is discharging a chemical that is not analyzed in the monthly sampling or the industry may not be discharging at the time of the sampling.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking site information and investigation activities. The tracking system for the monitoring results is a Microsoft Excel spreadsheet. The network drive is backed up every night by the City's Information Services Division. Responsibility for the program has been assigned to two storm water project coordinators who are responsible for inspecting and sampling related to industrial facilities.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

16 – CONSTRUCTION PLANNING PROCEDURES

(1) Objective of the SWMP Element

To ensure that the discharge of soil and other pollutants is minimized during the construction process.

(2) SWMP Element activities completed and those in progress

The City has existing requirements for erosion prevention and sediment controls on construction sites and has adopted the TDEC guide for the standards of practice. The City Drainage Manual has been revised and consists of three volumes (policy, storm water quantity, and storm water quality). The City of Memphis, Division of Engineering has implemented the policies and design requirements outlined in the SWMM (revised document). At that time any new projects that were submitted to the City Engineers office for review were evaluated with respect to the new policies. This new manual release superseded any and all previous manual releases and other documentation of storm water policy. The SWMM is posted at www.cityofmemphis.org/Government/EngineeringDivision.aspx.

The City has established a Storm Water Enterprise Fund. Owners or users of non-residential property can apply for a credit against the monthly fee for open space preservation or water quality buffers (as required in Part III, Section 3 of the Permit). A copy of the Storm Water Enterprise Fund Fee Adjustment and Credit Manual is posted on the City's web site at www.cityofmemphis.org/Government/PublicWorks/StormWaterInformation.aspx. Also, the OPD developed a UDC for development within the City and in unincorporated areas of the County using a form-based code approach. The UDC became effective January 1, 2011 and replaced both the Subdivision Regulations and the Zoning Ordinance. Chapter 8 of the UDC, which discusses natural resources protection including storm water management, has requirements for stream buffers (as required in Part III, Section 3 of the Permit).

A total of 149 erosion control plan reviews were performed during the Reporting Period representing 101 separate projects with 48 re-submittals. The plans pertained to private developments and City projects (e.g. road widening). The checklist for performing erosion control plan reviews is updated as needed. A note is placed on each reviewed plan reminding the engineer, owner, and developer that all state/NPDES requirements shall be met. A summary table of the erosion control plan reviews is provided in the Appendix.

Seventy-four new construction sites were added to the investigation list for a total of 155 construction sites under investigation during the Reporting Period. Forty-two construction sites were closed during the Reporting Period due to construction completion and proper site stabilization. A total of 1,276 construction site inspections were documented during the Reporting Period. During the Reporting Period, Storm Water Program staff issued 12 notices of violation and 3 civil penalties for unauthorized discharge from construction activities. A summary table of the notice of violations and civil penalties is provided in the Appendix.

(3) General discussion of element

The City construction planning procedures program involves erosion control plan review, inspection based on known construction sites and complaints, and enforcement to ensure that site operators implement and maintain the necessary BMPs.

(4) Status of SWMP Element

During the Reporting Period, Storm Water Program personnel continued to review erosion control plans submitted to the Land Development Office and plans produced by the Division of Engineering for City projects. Storm Water Program personnel continued to perform construction site inspections and take enforcement measures as required.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to verify that contractors install and maintain effective erosion controls. A storm water project coordinator and two technicians have been assigned the responsibility of inspecting construction sites. A project coordinator and/or the manager reviews the erosion control plans and records the information in a database. This information allows Storm Water Program staff to become aware of developments before construction begins.

Developers and larger builders from areas outside of Memphis appear to be knowledgeable of erosion control BMPs. However, problems are often encountered with smaller home builders who are not aware of their responsibility to control soil discharge from their sites. Problems also occur due to builders who are resistant to using proper BMPs. Lot ownership changes without proper notification often make responsible party determination problematic at home builder sites.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking site information and investigation activities. The network drive is backed up every night by the City's Information Services Division. The tracking system for inspections is the inspections database, which is easily sorted by inspector, location, watershed, status, etc. Construction inspection is the responsibility of one storm water project coordinator and two technicians. Stormwater Program personnel meet weekly to review investigations that may require follow-up.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

17- STRUCTURAL AND NON-STRUCTURAL BEST MANAGEMENT PRACTICES

(1) Objective of the SWMP Element

To ensure that structural and non-structural BMPs are chosen, designed and utilized as needed to minimize the discharge of pollutants into the storm drainage system.

(2) SWMP Element activities completed and those in progress

The City requires the submittal of Post Construction Run-off Control Plans (PCRC plans) with building plans submitted to the Division of Engineering Office of Land Development. The PCRC plans are required for all developments and redevelopments within the City (with the exception of residential development with no structural controls and linear projects).

The PCRC plans guidance document is updated as needed. The City currently uses the Post Construction Run-Off Control, Technical Standards, Structural and Non-Structural Best Management Practices, Interim Guidance Document, Version 2.0 for BMP designs. Notes are placed on each reviewed plan that remind the engineer and developer of the City's storm water fee and the available credits for water quantity and water quality criteria. The plans are currently being used by the Storm Water Program to ascertain the impervious area of the development for fee payment purposes and as a mechanism to track detention and water quality structures. Structural as well as non-structural BMPs are required to be listed on the plans.

The Storm Water Program reviewed 84 PCRC plans during the Reporting Period. These plans represented 66 different sites with 18 re-submittals. The reviews included 32 plans with detention structures/water quality BMPs. A summary table of the PCRCP reviews is provided in the Appendix.

Construction of a regional BMP for debris removal in Gayoso Bayou was completed in April 2012. Approximately 2,130 acres of downtown Memphis drain through Gayoso Bayou and into the Wolf River Harbor. During the Reporting Period, approximately 5,400 gallons of material have been collected and removed.

As mentioned in the previous annual report, the City hired an engineering firm to conduct an inventory and condition inspection of all underground structures, greater than 6 feet wide, in the Gayoso Basin. The structures were classified based on their structural condition to assist in managing maintenance and routine inspections. Reports were prepared for each sub-basin. This project was ultimately separated into 2 phases due to budget constraints. Phase 1 was a series of 13 sub-projects consisting of spot repairs of drainage culverts and pipes and was completed during the last reporting period. Phase 2 is the rebid of 1 of the major repair sub-projects and it commenced this Reporting Period.

During the Reporting Period, Drain Maintenance continued to order and install "bike friendly" storm drain grates. The drain grate includes the text "DUMP NO WASTE DRAINS TO RIVER." The text is stamped into the cast iron during manufacturing. During the Reporting Period, Drain Maintenance continued to replace drain grates throughout the City as a continued effort to increase awareness. Also, private developments are beginning to use drain grates with storm water friendly text stamped into the cast iron. In addition, Storm Water Program personnel provided materials and instructions for placing 441 "ONLY RAIN DOWN THE STORM DRAIN" markers on street inlets.

The City Drainage Manual and Subdivision Regulations govern the planning, design, maintenance and legal recordation requirements of storm water detention facilities. The City Drainage Manual has

been revised and consists of three volumes (policy, storm water quantity, and storm water quality). As part of the policy volume, a Post-Construction Runoff Control Inspection and Maintenance Agreement is included and is to be signed by the owner/developer as part of the land development contract. In addition to standard engineering techniques the new publication includes sustainable BMPs that can be implemented by the public. Recommendations and technical information are included to provide a method of education for persons interested in implementing these BMPs. The City of Memphis, Division of Engineering began full implementation of the policies and design requirements outlined in the SWMM. Any new projects that are submitted to the City Engineers office for review are evaluated with respect to the new policies. This manual release superseded any and all previous manual releases and other documentation regarding storm water policies. The SWMM is posted at www.cityofmemphis.org/Government/EngineeringDivision.apsx.

The City Storm Water Enterprise Fund provides incentives to owners or users of non-residential property can apply for a credit against the monthly fee for detention facilities based on water quality and quantity criteria. A copy of the Storm Water Enterprise Fund Fee Adjustment and Credit Manual is posted on the City's web site at http://www.memphistn.gov/portals/0/pdf_forms/creditManualJan2006.pdf.

Since conception of the storm water fee, 15 credit applications have been submitted and all have been approved.

(3) General discussion of element

The City of Memphis is required by its Permit to reduce the discharge of pollutants to the Maximum Extent Practical (MEP) and to not cause or contribute to violations of State water quality standards of the receiving streams. MEP is defined in the Permit as a technology-based discharge standard for Municipal Separate Storm Sewer Systems established by the Clean Water Act. MEP is achieved, in part, by selecting and implementing effective BMPs and rejecting applicable BMPs only when the BMPs would not be technically feasible or the cost would be prohibitive and unreasonable.

In Memphis, structural BMPs typically consist of storm water detention basins serving private developments which provide some degree of water quality treatment provided they are properly maintained. The Engineering and Public Works Divisions are becoming more experienced with water quality units and other treatment units that are being promoted as BMPs or with the approval of detention basin designs that incorporate water quality elements, having historically been charged with addressing water quantity. The history of yellow fever epidemics in the Memphis area has encouraged infrastructure designs that do not allow standing water for more than a few hours. The majority of streams in the Memphis area which have been assessed are on the TDEC 303(d) list as Category 5, meaning that the waterbody is impaired to the extent that it does support one or more designated uses. As a result, a Total Maximum Daily Load (TMDL) has been, or will be, issued for the contaminant of concern for each waterbody.

(4) Status of SWMP Element

The Storm Water Program continues to require and review PCRC plans.

The SWMM and Subdivision Regulations govern the design, maintenance and legal recordation requirements of storm water detention facilities. Also, owners or users of non-residential property can apply for a credit against their monthly fee based on water quality and quantity criteria.

(5) SWMP Element strengths and weaknesses

PCRC plan submittals are required for all developments and redevelopments within the City (with the exception of residential development with no structural controls and linear projects). A copy of the

Post Construction Run-off Control Guidance Document Version 2.0 is available on the Internet. Owners or users of non-residential property can apply for a credit against their monthly storm water fee based on water quality and quantity criteria. Additionally, non-residential storm water customers can receive a ten percent credit for performing non-structural BMPs including parking lot sweeping, trash management, employee training in storm water awareness, etc.

The City of Memphis, Division of Engineering has implemented the policies and design requirements outlined in the SWMM. Any new projects that are submitted to the City Engineers office for review are evaluated with respect to the new policies. This manual release superseded any and all previous manual releases and other documentation regarding storm water policies.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking the structural and non-structural BMPs program. The network drive is backed up every night by the City's Information Services Division. PCRC plan review is the responsibility of a project coordinator and the manager. A check list is used to perform the plan reviews. The reviews are tracked in the database and a hard copy of the plan is kept on file for reference.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

18- PRIORITIZING PRACTICES

(1) Objective of the SWMP Element

To ensure the timely inspection of critical sites and, if applicable, the initiation of appropriate enforcement actions to have identified problems corrected.

(2) SWMP Element activities completed and those in progress

During the Reporting Period, the site prioritizing system emphasized construction activity and illicit discharge, specifically disposal of yard debris into the storm sewer system, littering and pet waste removal. The factors contributing to this emphasis included: regulated construction activity, greater awareness regarding the potential impact of siltation from construction sites, littering and pet waste on the environment, and blockage of storm drains resulting in localized flooding.

The Storm Water Program has 12 budgeted positions. During most of the Reporting Period, 7 positions were filled which consisted of a program manager, an environmental project manager, 2 storm water project coordinators, 2 technicians, and a scheduler planner. The authorized complement consists of a manager, an environmental project manager, 4 storm water projects coordinator, 5 environmental technicians, and 1 scheduler planner. The Stormwater Program also has a clerk that assist in various projects as needed. One coordinator and 2 technicians are primarily concentrated on construction site inspections and illicit debris disposal. One coordinator and 2 technicians conduct plan reviews, ambient sampling, municipal good housekeeping, BMP inspections, and other special projects. One coordinator and 1 technician are responsible for illicit discharge inspections, municipal inspections and training. The scheduler planner resolves storm water fee billing inquiries and manages the department's database. Public education and participation (event planning and deployment of staff and supplies) is mainly the responsibility of 1 coordinator but all staff participates. The environmental project manager oversees and provides technical support in conducting environmental contamination assessments, coordinates technical activities and directs resources (both internal and contractors) associated with implementing the Permit. All activities are managed by a Storm Water Program Manager. A copy of an organizational chart is provided in the Appendix.

(3) General discussion of element

The majority of streams in the Memphis area which have been assessed are on the TDEC 303(d) list as Category 5, meaning that the waterbody is impaired to the extent that it does not support one or more designated uses. As a result, a Total Maximum Daily Load (TMDL) has been, or will be, issued for the contaminant of concern for each waterbody. Also, based on TDEC's antidegradation policy, the majority of rivers and streams would be Antidegradation Category Tier 1 and additional loadings of pollutants not allowed. Therefore, all investigations within Memphis would be classified as "priorities." Per Part III, Section 4 of the Permit, inspection of priority construction activities is required at least quarterly. Priority construction sites are sites where a discharge or potential discharge (i.e. no BMPs in place) has been reported to or observed by the Storm Water Program.

(4) Status of SWMP Element

The Storm Water Program continues to inspect priority construction sites to insure compliance. Sites which have been more problematic than others are inspected more often, especially after rain events. All priority construction sites are scheduled to be inspected at least every ninety days. Illicit discharges and complaints are inspected as needed until the illicit discharge is eliminated and the investigation closed.

(5) SWMP Element strengths and weaknesses

The strength of this element is that it effectively prioritizes sites for allocation of resources. A weakness in the element includes the difficulty in identifying the person responsible for the illicit discharge to correct the problem and in dealing with transient and recalcitrant responsible parties.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking the site information and investigation activities. The network drive is backed up every night by the City's Information Services Division. All Storm Water Program personnel participate in enforcement activities based on their program area and enter information into the investigations database as required. Responsibility for the inspections database is shared between the Manager and the storm water program scheduler planner who are responsible for reviewing the data entry for accuracy and consistency. The tracking system for inspections is the inspections database, which is easily sorted by inspector, location, watershed, status, etc. Each investigation is assigned to either a project coordinator or technician. The Storm Water Program staff meets weekly to review investigations.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

19 – EDUCATIONAL ACTIVITIES

(1) Objective of the SWMP Element

To provide public education encouraging citizens not to contribute to water pollution and to enable them to have the knowledge to identify water pollution problems. Citizens are encouraged to report suspected problems to the City for investigation and enforcement.

(2) SWMP Element activities completed and those in progress

The City has an extensive educational program including: brochures, tip cards (fact sheets), newspaper, magazine, television advertisements, radio, press releases, public speaking/event participation, student education, storm drain stenciling, watershed cleanups and storm water public meetings with public notice.

BROCHURES AND PROMOTIONAL ITEMS: A summary of brochures and storm water related promotional items given out is provided in the Appendix.

NEWSPAPER AND MAGAZINE ADS: During the Reporting Period, the Storm Water Program advertised in the following publications: *The Memphis Flyer, La Prensa Latina, and Jabber Blabber*. An advertisement placement summary is included in the Appendix.

TELEVISION ADS: During the Reporting Period, the Storm Water Program advertised various storm water pollution issues on FOX 13. A summary of the televisions advertisements is provided in the Appendix.

RADIO: During the Reporting Period, as part of the large scale educational effort to promote general storm water awareness, the City broadcasted on various local radio stations through the Tennessee Association of Broadcasters Public Education Program (TAB-PEP). A summary of the radio station advertisements is provided in the Appendix.

PRESS RELEASES: The Storm Water Program distributed 11 press releases during the Reporting Period concerning a variety of issues ranging from storm water pollution to announcements of upcoming public meetings. A summary table of the press releases is provided in the Appendix.

BILLBOARD, TRANSIT SHELTER, & BUS BACK ADVERTISING: During the Reporting Period, the Storm Water Program conducted a large scale education effort using transit shelters and billboards to raise general storm water awareness. The "Only Rain Down the Drain" campaign consisted of 2 billboards and 5 transit shelters. The 2 billboards were located in 5 different locations over 5 months during the reporting period. The 5 transit shelters were located in 30 different locations over a 6 month period. Over the course of the campaign, 1,403,600 impressions were made. A new method of advertising was tested during the reporting period utilizing bus backs to run in conjunction with the "Only Rain Down the Drain" billboard and transit shelter campaign. Five bus backs ran during a 1 month period. The buses ran within the City limits and had a large scale illustration demonstrating what goes down the drain comes out in our rivers. Additionally, during the Reporting Period, a large scale education effort was initiated using transit shelters to encourage proper disposal of lawn waste. The "Don't Blow It" campaign started March 2014, consisted of 9 transit shelters, and ended December 2014. The 9 transit shelters were located in over 18 different locations over the 9 month period. Over the course of the campaign, 1,342,310 impressions were made.

A large scale education effort was also conducted to discourage disposal of grease in the sanitary sewer system. The "Can the Grease" campaign was comprised of three billboards and five transit shelter ads and was conducted from July 2014 through June 2015. One billboard rotated every 6 months. The second billboard rotated every 2 months. The shelter ads were located at five locations and rotated every four weeks. It is estimated that over 78,000,000 impressions were made over the course of the campaign. Transit shelter and billboard locations are provided in the Appendix.

PUBLIC SPEAKING/EVENT PARTICIPATION: The Storm Water Program participated in 20 events during the Reporting Period. Presentations were given at 9 of the events including two public meetings.

The remaining events were manned by Storm Water Program staff who talked about storm water awareness and/or materials were provided to the public. A summary table of the events is provided in the Appendix.

STUDENT EDUCATION: Storm water information was made available to all schools in the City about storm water pollution prevention including the materials developed as part of the Storm Water Environmental Education Project/Pre-Engineering Enrichment Program (SWEEP/PEEP) which have a variety of activities suitable for different grade levels. During the Reporting Period, the Storm Water Program staff conducted storm water awareness training with the SWEEP/PEEP students. The students participated in water testing and sampling at Bateman Bridge. The Storm Water Program staff made 5 visits to school events, presenting to 1,200 students, throughout the City. Storm water pencils and sharpeners, erasers, and brochures were distributed at many of the school events. A button maker was used at many of the events. A summary table of the school events is provided in the Appendix.

In addition, during the Reporting Period, the Storm Water Program designed and installed rain gardens at 3 Shelby County Schools (formerly Memphis City Schools): Belle Forrest Community School, Hickory Ridge Middle, and Kirby High School. Furthermore, grade appropriate outdoor educational curriculums and educational kiosks were designed for all 3 schools to aid in teaching the concepts of water quality, storm water management, watershed management, and hydrology. The installations of the kiosks are scheduled to be complete next reporting period.

WATERSHED CLEANUPS: The Storm Water Program participated in 6 cleanups. The Storm Water Program partnered with local groups such as Clean Memphis and Memphis City Beautiful. This helped increase awareness and volunteers for the cleanups. Cleanup locations were throughout the City. The Storm Water Program will continue to partner with local groups for watershed cleanups. A summary table of the events is provided in the Appendix.

STORM WATER PUBLIC MEETINGS WITH PUBLIC NOTICE: The Storm Water Program conducted public meetings on October 29, 2014 and May 28, 2015. The October meeting was held at the Kroc Center. This meeting focused on the effects of improper disposal of yard waste. The May meeting was held at the Bass Pro Shop located in the Pyramid Big Cypress Lodge and focused on the effects of water quality and aquatic life.

STORM WATER FEE: In accordance with the City Stormwater Enterprise Fund, all residential and non-residential (including churches, schools, businesses, and government entities) units are charged a fee based on residential category (residential property) or impervious area (non-residential property). The general public and others can call (901) 636-4349 for billing and other storm water questions from 7:00 a.m. to 3:30 p.m. Monday through Friday.

The storm water fee credit program offers economic incentives to both private companies and private/public schools to provide storm water education programs for their employees and for students. Since conception of the storm water fee, 15 credit applications have been submitted and all have been approved.

TENNESSEE STORM WATER ASSOCIATION: The City Storm Water Program continued to meet with the Western Region MS4s during the Reporting Period. Area and state wide storm water issues as well as QLP and permitting updates were discussed at each meeting. Two meetings were attended during the Reporting Period.

(3) General discussion of element

The City's educational activities program covers a broad range of media and audiences, including:

- classroom and field activities with school students
- ads and articles in newspapers, magazines, pharmacy bags, and transit shelters
- city-wide public participation meetings and neighborhood meetings
- booths at several public festivals, shows, and annual events

As needed for a large, diversified urban audience, the City program provides a large number of educational activities and approaches to ensure the maximum impact for the audience to learn how to prevent stormwater pollution.

(4) Status of SWMP Element

The City continued implementation of an educational activities program that meets all of the requirements of Part III, Sections 1 and 2 of the Permit. The storm water fee credit program continues to offer economic incentives to both private companies and private/public schools to provide storm water education programs.

(5) SWMP Element strengths and weaknesses

The element appears to be an effective mechanism to educate the broadest audience as much as possible about the causes and effects of storm water pollution, while providing the opportunity to develop and implement focused campaigns targeted at segments of the population whose activities contribute to storm water pollution. Weaknesses in the element include the difficulty in getting the storm water message noticed among the large number of messages to which people are exposed on a daily basis, as well as the uncertainty about the number of people that will participate in events, such as the speaking engagements, watershed cleanups and public participation meetings. Employers and educators are encouraged to promote storm water awareness based on the economic incentives offered by the storm water fee credit program.

(6) Assessment of controls

A database using Microsoft Access 2003 on a shared network drive is used for tracking the storm water education, public events, advertising, and item giveaways. The network drive is backed up every night by the City's Information Services Division. Responsibility for the education and event program is shared between the manager and a storm water project coordinator who are responsible for event planning and deployment of required personnel and database maintenance.

(7) Discussion of element revisions

No revisions are planned to this element at this time.

5

MONITORING SECTION

SUMMARY OF THE MONITORING PROGRAM: Monitoring required by the City of Memphis Storm Water Permit includes the following:

- Wet Weather Sampling as determined to be necessary
- In-Stream Ambient Monitoring at 23 sites
- Biological Assessment of two streams once during the Permit Term

No wet-weather sampling was performed during the Reporting Period.

In-Stream Ambient Monitoring was conducted monthly at each of the 27 sites, except where representative samples could not be obtained due to backwater conditions during high Mississippi River water levels or when there was no flow due to dry conditions. In January 2008, an additional sampling location was added along the Wolf River. The location is the North Second Street Bridge over the Wolf River. The results of the monitoring are included in Appendix.

No biological assessment was conducted during the Reporting Period. Both the City and TDEC agreed that additional sampling was not necessary as this Permit requirement had been satisfied in previous reporting periods.

(1) EXPLANATION and RATIONALE:

The City expanded its in-stream monitoring program based on experiences gained during the 1996 – 2003 permit term. During this period, it was observed that the City and TDEC obtained the most useful data from regular sampling for the parameters in the ambient sampling program. This type of sampling provides very useful data, both in the determination of water quality in a water body, as well as providing data for whether or not the water body needs to be on the 303(d) list and for the development of Total Maximum Daily Loads, if necessary. Other types of data collection, including wet weather monitoring, do not provide the same sort of continuous, regular reliable stream of data. The other types of data collection are useful for specific situations.

(2) SUMMARY CHART OF THE DATA FROM ANY MONITORING COMPLETED:

The summary charts of the data from the monitoring discussions are included within the Appendices.

(3) DISCUSSION OF ANY RESULTS OR CONCLUSIONS DERIVED FROM THE MONITORING COMPLETED:

- In-stream Ambient Monitoring: All parameters are relatively consistent throughout the Reporting Period with the exception of E. coli and total suspended solids (TSS). Based on review of the data, no distinct correlation could be made between E. coli and TSS concentrations.

(4) EXPLANATION AND RATIONALE FOR A PROGRAM OF BIOLOGICAL ASSESSMENTS:

Biological assessments were not conducted during this Reporting Period.

(5) DISCUSSION OF MONITORING PROGRAM REVISIONS THAT ARE SUMMARIZED ELSEWHERE IN THE ANNUAL REPORT:

No revisions to the required monitoring program were made during the Reporting Period. The City intends to conduct additional sampling as warranted throughout the implementation of its storm water program.

6

SUMMARY OF THE SWMP AND MODIFICATIONS IN THE MONITORING PROGRAM MADE DURING THE PERMIT YEAR

In summary, the implementation of the programs required by the NPDES permit issued to the City of Memphis by the State of Tennessee continued in accordance with the SWMP specified in the NPDES permit schedule. The work undertaken to date has resulted in the detection and elimination of many discharges and illegally dumped materials that otherwise would have reached area waterways.

No revisions to the required monitoring program are planned. The City intends to conduct additional sampling as warranted throughout the implementation of its storm water program.

CHANGES THAT THE PERMITTEE IS EXPECTED TO MAKE TO THE STORM WATER MANAGEMENT PROGRAMS FOR THE YEAR FOLLOWING THE REPORT YEAR

No significant changes in the monitoring program are expected. The requirements of the NPDES permit will continue to be implemented as required until such time as the new permit is issued.